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so that in the first quarter second of opening the final isothermal pressure p_3 (chambers communicating) is already reached to more than 60 per cent., and my smallest fog chamber holds over 6 liters. One naturally asks whether the importance of this in its bearing on the measurements of the ratio of specific heats k/c, has ever been adequately appreciated.

Fluorescence Absorption: E. L. NICHOLS and ERNEST MERRITT, Cornell University.

Energy Necessary to Ionize a Molecule by Impact of Negative Electrons: BERGEN DAVIS, Columbia University.

The Transformation into an Electric Current of Radiation Incident on a Moving Surface: BERGEN DAVIS, Columbia University.

The Standard Cell: F. A. WOLFF and C. E. WATERS, Bureau of Standards.

The Equilibrium of Mercurous Sulphate and Mercury and Cadmium Sulphate: F. A. WOLFF and C. E. WATERS, Bureau of Standards.

The Distribution of Energy emitted by a Righi Vibrator: C. R. FOUNTAIN.

The Constants in Gas-viscosity: WILLARD J. FISHER, Cornell University.

Production of Radium by Actinium: BERTRAM B. BOLTWOOD.

Production of Radium from Actinium: E. RUTHERFORD.

The Influence of Electrical Fields upon Spectral Lines: G. F. HULL, Dartmouth College.

Helion, a New Incandescent Lamp Filament: H. C. PARKER and W. G. CLARK.

The Magnetic Rotation of Sodium Vapor at the D lines: R. W. WOOD.

Flourescence Spectra of Mercury Vapor: R. W. WOOD.

Hydraulic Analogy of the Welsbach Mantle and other Radiators: R. W. WOOD.

The Shielding of a Highly Sensitive Galvanometer: E. F. NICHOLS and S. R. WILLIAMS.

On the Temperature of the Mercury Arc: CHARLES T. KNIPP.

A Study of the Reversible Pendulum: JOHN C. SHEDD and JAMES A. BIRCHBY.

Wave-metrical Measurements with Wireless Telegraph Circuits: G. W. PIERCE.

The Electrical Properties of Carborundum: G. W. PIERCE.

DAYTON C. MILLER,
Secretary of Section B

SCIENTIFIC BOOKS

Qualitative Analysis as a Laboratory Basis for the Study of General Inorganic Chemistry. By WILLIAM CONGER MORGAN, Ph.D. (Yale), Assistant Professor of Chemistry in the University of California. New York, The Macmillan Company; London, Macmillan & Co., Ltd. 1906. Pp. xiv + 351.

That the last word as to the best method of teaching chemistry has not yet been spoken is evidenced by the number of new text-books in general and analytical chemistry. Such a multiplicity of new books may be from a financial standpoint unsatisfactory to authors and publishers, but it reveals an activity and healthy independence on the part of teachers of chemistry. Most if not all these books are written, not to sell, but to bring out the writer's views for his own classes.

The latest book on qualitative analysis is that by Dr. Morgan, and is to some extent along new lines. Most teachers of chemistry in colleges are confronted with a difficulty arising from the chemistry of fitting schools. Comparatively few students present themselves for entrance to college well grounded in general chemistry, especially as viewed from the modern physical chemical standpoint, and yet these men are too advanced to be put in a class which is open to beginners. They have

often studied much descriptive chemistry, but are not ready for analytical chemistry as ordinarily taught. Confronted by this difficulty at the University of California, Dr. Morgan has prepared this book, in which "the scheme of qualitative analysis is made to serve as a means of correlating the apparently independent experiments of general chemistry." It is intended primarily for those, "the exigencies of whose vocational courses render it impracticable" for them "to devote more than one year to general inorganic chemistry and to qualitative analysis as well." The author well says in the preface: "Instruction in science should endeavor to equip the student with principles rather than facts, and, what is of still greater import, it should train him in the use of these principles and in the application of them in explaining the phenomena of general experience."

The book is divided into four parts: General, Descriptive, Analytical, Appendix. Part I. is an outline in sixty pages of the principles of chemistry from the standpoint of physical chemistry, presupposing a knowledge on the part of the student, of general chemistry as taught in schools. The topics Dissociation, Equilibrium and Mass Action, Hydrolysis, Repression of Ionization, Solute and Solvent, and Oxidation and Reduction, are treated with satisfactory clearness, and the judicious use of black-letter for important topics and italics for important principles should greatly assist the student. The abandonment of the sign of equations and substitution therefor of the arrow to indicate the general direction of the reaction is a recent innovation, and has much to commend it, and may save the student from having later to reverse the early acquired notion that a single equation expresses quantitatively all that takes place in a reaction. It serves also to emphasize the important conception of equilibrium.

Part II. comprises about half the book. At first sight, this part, which is a study of the reactions of the elements, would seem to follow the plan of many older text-books on qualitative analysis, which weary the student with a mass of test-tube reactions, before he comes to any application of their use. In this book we have rather a systematic study of the elements in the order of their occurrence in the periodic table, with special reference to their ions. The method of treatment may be illustrated by the topic Arsenic. This opens with a brief description of the element; then follows its oxidation and solution; the existence of arsenic ions; its reduction; the Bettendorf, Marsh and Reinsch tests; the relation of the arsenious kathion to the hydroxyl, carbonate, sulfid, sulfate and chlorid anions; arsenic compounds; arsenious acid and arsenites; salts of thioarsenious acid; arsenic acid and the reactions of its ion with barium, silver, magnesium and molybdate ions; salts of the thioarsenic acids. One great advantage of this method of study is that the student gains a comprehensive view of the element in all its compounds, and that the sequence of elements according to the periodic table shows him the relation the element bears to its neighbors. Further, those compounds and reactions chosen as illustrations are the ones he meets in analytical chemistry. This division of the book, as far as I can recall, attempts something unique; how it will work practically in other hands than the author's remains to be seen, but it reads as if it would prove successful.

Part III., on qualitative analysis, opens with solution and preliminary examination of solids. Then follow tables for separations of bases, each with a full discussion conveniently arranged below and on the opposite page. The analysis of acids is similarly arranged with the discussions opposite the tests. Mention should be made of two or three commendable procedures in the course of analysis. In the basic analysis the detection and removal of interfering substances in the filtrate from the hydrogen sulfid precipitate are excellently treated; aluminum, chromium and iron are precipitated as basic acetates, and the chromium oxidized with sodium peroxid; cobalt is removed from the nickel-cobalt solution by potassium ferricyanid in the presence of ammonia and a little alum solution, to assist in collecting the cobalt ferricyanid for filtration;

the nickel is recognized in the filtrate by adding a little piece of solid caustic soda. In the acid analysis the acids are classified by the character of their barium and silver salts, and their most characteristic reactions well discussed.

Part IV., the appendix, contains the preparation of reagents, specific gravity and solubility tables, and considerable physical data. In the strength of reagents, it is gratifying to see that another convert has been added to the comparatively few teachers who have adopted the Reddrop system of normal reagents. The great advantage of the system is that the student knows the strength of the reagents he is using, and soon comes to avoid the use of great excess. Unconsciously he becomes familiar with the elements of volumetric analysis. The strengths recommended by the author differ a little from those originally suggested by Reddrop. For dilute acids and alkalies, 4 N solutions are used, and for salts $N/2$ generally. The ordinary reagents are N. In this laboratory $5N$ for acids, $5/2\,N$ for alkalies, and $N/5$ for most salts have been found convenient.

The press work of the book is excellent and typographical errors are very few. There is a complete index.

JAS. LEWIS HOWE
WASHINGTON AND LEE UNIVERSITY,
LEXINGTON, VIRGINIA

SCIENTIFIC JOURNALS AND ARTICLES

THE March number (volume 13, number 6) of the *Bulletin of the American Mathematical Society* contains the following articles: Report of the Thirteenth Annual Meeting of the American Mathematical Society, by F. N. Cole; Report of the December Meeting of the Chicago Section, by H. E. Slaught; 'The Decomposition of Modular Systems Connected with the Doubly Generalized Fermat Theorem,' by E. H. Moore; 'Systems of Extremals in the Calculus of Variations,' by Edward Kasner; 'A Necessary Condition for an Extremum of a Double Integral,' by Max Mason; Shorter Notices; Nielsen's Handbuch der Theorie der Gammafunktion, by Virgil Snyder; Jouffret's Mélanges de Géométrie à Quatre Dimensions, by Peter Field; Lanner's Neuere Darstellungen der Grundprobleme der reinen Mathematik im Bereiche der Mittelschule, by D. E. Smith; Reformvorschläge für den mathematischen und naturwissenschaftlichen Unterricht, entworfen von der Unterrichtskommission der Gesellschaft deutscher Naturforscher und Aerzte (Zweiter Teil), by J. W. A. Young; de Peslouan's N. H. Abel, sa Vie et son Oeuvre, by Florian Cajori; 'Notes'; 'New Publications.'

The April number contains: Report of the February Meeting of the American Mathematical Society, by F. N. Cole; 'The Construction of a Field of Extremals about a Given Point,' by G. A. Bliss; 'Some Particular Solutions in the Problem of n Bodies,' by W. R. Longley; 'On the Matrices of Period a Power of p in Jordan's Linear Congruence Groups, Modulo p^{α},' by Arthur Ranum; 'On the Construction of an Integral of Lagrange's Equations in the Calculus of Variations,' by D. C. Gillespie; 'Algebraic Numbers and Forms' (Review of Bachmann's Allgemeine Arithmetik der Zahlenkörper and König's Einleitung in die allgemeine Theorie der Algebraischen Grössen), by L. E. Dickson; 'Notes'; 'New Publications.'

SOCIETIES AND ACADEMIES

THE AMERICAN CHEMICAL SOCIETY, NEW YORK SECTION

THE fifth regular meeting of the session of 1906–07 was held at the Chemists' Club, 108 W. 55th Street, on March 8.

Pursuant to the amendment to the by-laws of the section adopted February 8, the annual election of officers, to assume their duties at the close of the June meeting following, was held with the following result:

Chairman—H. C. Sherman.
Vice-Chairman—F. J. Pond.
Secretary and Treasurer—C. M. Joyce.
Executive Committee—Virgil Coblentz, G. C. Stone, C. H. Kiessig, Durand Woodman.

The chairman called attention to the great loss to the society occasioned by the untimely death of its honorary member, Henri Moissan,